UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/058,707	01/28/2002	Atsushi Ueda	10059-404US (P27007-01)	7373

570 7590 07/07/2004

AKIN GUMP STRAUSS HAUER & FELD L.L.P.
ONE COMMERCE SQUARE
2005 MARKET STREET, SUITE 2200
PHILADELPHIA, PA 19103-7013

EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 07/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/058,707	UEDA ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/17/04 has been entered.

This office paper is in reply to the foregoing RCE. The applicants have overcome the 35 USC 102 rejection over Sekino et al'712. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, the present claims are newly rejected over substantially the same art as seen below.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-9 and 12-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takami et al US 2003/0118913 in view of Mita et al 6315918.

As to claims 1 and 5:

Takami et al disclose a non-aqueous electrolyte secondary comprising an electrode group including a positive electrode, a negative electrode and a non-aqueous electrolyte including solvents and lithium salts dissolved therein (ABSTRACT). It is disclosed to use cyclic carbonates together with γ-butyrolactone (BL) wherein the cyclic carbonates include ethylene carbonate (EC), propylene carbonate (PC) and vinylene carbonate (VC) (SECTION 0058-0059). It is further disclosed that is it is also desirable to prepare a mixed solvent by mixing BL with a third solvent such as PC, VC and an aromatic compound (SECTION 0059). Takami et al further disclose preferred combinations of the non-aqueous solvents including a combination of BL, EC, VC and methylethyl carbonate (MEC), a combination of BL, EC and VC, a combination of BL, PC and VC and a combination of BL, EC, PC and VC (SECTION 0061, 0174-0176).

Takami et al further discloses the specific solvents containing γ-butyrolactone in a mixed solvent containing solvents such as (SECTION 0057-0059):

[0058] It is desirable to use a cyclic carbonate together with BL in the present invention because the cyclic carbonate permits improving the charge-discharge efficiency.

[0059] The cyclic carbonate used in the present invention includes, for example, propylene carbonate (PC), ethylene carbonate (EC), vinylene carbonate (VC), and trifluoropropylene carbonate (TFPC). Particularly, if EC is used together with BL, the charge-discharge characteristics and the large discharge characteristics can be markedly improved. It is also desirable to prepare a mixed solvent by mixing BL with at least one kind of a third solvent selected from the group consisting of PC, VC, TFPC, diethyl carbonate (DEC), methyl ethyl carbonate (MEC) and an aromatic compound. The mixed solvent of the particular construction permits improving the charge-discharge cycle characteristics.

Examples 15-18 show the following solvent combination (SECTIOONS 0272-0275):

EXAMPLE 15

[0272] A thin nonaqueous electrolyte secondary battery was obtained as in Example 1, except that the nonaqueous electrolyte used was prepared by dissolving 1.5 mol/l of $LiBF_4$ in a mixed nonaqueous solvent consisting of 24% by volume of ethylene carbonate (EC), 75% by volume of γ-butyrolactone (BL) and 1% by volume of vinylene carbonate (VC).

EXAMPLE 16

[0273] A thin nonaqueous electrolyte secondary battery was obtained as in Example 1, except that the nonaqueous electrolyte used was prepared by dissolving 1.5 mol/l of $LiBF_4$ in a mixed nonaqueous solvent consisting of 23% by volume of ethylene carbonate (EC), 75% by volume of γ-butyrolactone (BL) and 2% by volume of vinylene carbonate (VC).

EXAMPLE 17

[0274] A thin nonaqueous electrolyte secondary battery was obtained as in Example 1, except that the nonaqueous electrolyte used was prepared by dissolving 1.5 mol/l of $LiBF_4$ in a mixed nonaqueous solvent consisting of 24.5% by volume of ethylene carbonate (EC), 75% by volume of γ-butyrolactone (BL) and 0.5% by volume of vinylene carbonate (VC).

EXAMPLE 18

[0275] A thin nonaqueous electrolyte secondary battery was obtained as in Example 1, except that the nonaqueous electrolyte used was prepared by dissolving 1.5 mol/l of $LiBF_4$ in a mixed nonaqueous solvent consisting of 25% by volume of ethylene carbonate (EC), 74% by volume of γ-butyrolactone (BL) and 1% by volume of toluene.

<u>As for claims 2-3:</u>

Takami et al disclose the specific use of γ-butyrolactone (BL) (SECTION 0057-0059).

<u>Regarding claims 4 and 6-9:</u>

As seen above, Takami et al disclose the use of mixed solvents such as vinylene carbonate (VC), propylene carbonate (PC), ethylene carbonate (EC), γ-butyrolactone (BL) and methyl ethyl carbonate (MEC) and diethyl carbonate (DEC) (Sections 0059, 0061. 0174-0176).

[0061] Preferred combinations of the nonaqueous solvents used in the present invention include, for example, a combination of BL and EC, a combination of BL and PC, a combination of BL, EC and DEC, a combination of BL, EC and MEC, a combination of BL, EC, MEC and VC, a combination of BL, EC and VC, a combination of BL, PC and VC, and a combination of BL, EC, PC and VC. In this case, it is desirable to set the mixing ratio of EC to fall within a range of between 5 and 40% by volume. It should be noted

<u>As to claims 12-13:</u>

Takami et al disclose that as positive and negative electrode material the following compounds can be used (SECTION 0029):

[0029] Examples of the positive electrode active material are various oxides such as manganese dioxide, lithium manganese composite oxide, lithium-containing nickel oxide, lithium-containing cobalt oxide, lithium-containing nickel cobalt oxide, lithium-containing iron oxide, and lithium-containing vanadium oxide, and chalcogen compounds such as titanium disulfide and molybdenum disulfide. Of these materials, lithium-containing cobalt oxide (e.g., $LiCoO_2$), lithium-containing nickel cobalt oxide (e.g., $LiNi_{0.8}Co_{0.2}O_2$), and lithium manganese composite oxide (e.g., $LiMn_2O_4$ and $LiMnO_2$) are preferably used because high voltage can be obtained.

As negative electrode material graphite can be used (SECTION 0038).

<u>As to claims 14 and 16 (*see also specific rejection of claims 14 and 16 below*):</u>

Takami et al teaches the employment of <u>lithium salts</u> being $LiPF_6$ and $LiBF_4$ the most preferred (SECTION 0064):

[0064] Examples of the electrolytic salt contained in the nonaqueous electrolyte are lithium salts such as lithium perchlorate ($LiClO_4$), lithium hexafluoride ($LiPF_6$), lithium borofluoride ($LiBF_4$), lithium arsenic hexafluoride ($LiAsF_6$), lithium trifluoromethasulfonate ($LiCF_3SO_3$), and bistrifluoromethylsulfonylimide lithium [$LiN(CF_3SO_2)_2$]. Of these lithium salts, $LiPF_6$ and $LiBF_4$ are most preferred.

As to claim 15:

Takami et al further disclose the following with respect to the solvent comprising a benzene-like or derivative compound such as benzene, toluene, xylene, byphenyl and terphenyl (SECTION 0063):

[0063] It is possible to use a nonaqueous solvent containing BL in an amount larger than 50% by volume and not larger than 95% by volume, EC and an aromatic compound in place of the mixed nonaqueous solvent of the composition described previously. The aromatic compound is at least one compound selected from the group consisting of benzene, toluene, xylene, biphenyl and terphenyl. EC is deposited on

Example 41 shows the specific solvent mixing solution:

EXAMPLE 41

[0312] A thin nonaqueous electrolyte secondary battery was obtained as in Example 26, except that a nonaqueous electrolyte used was prepared by dissolving 1.5 mol/l of $LiBF_4$ in a mixed nonaqueous solvent consisting of 25% by volume of ethylene carbonate (EC), 74% by volume of γ-butyrolactone, and 1% by volume of toluene.

Takami et al disclose a non-aqueous electrolyte secondary battery according to the foregoing. However, Takami et al do not disclose the specific use of vinylethylene carbonate solvent.

Mita et al disclose non-aqueous electrolytic solutions employed in the electrochemical field (ABSTRACT). For example, Mita et al disclose that organic solvent-based electrolytic solutions (non-aqueous electrolytic solution) show high potential window of electrochemical stability (COL 1, lines 52-57/COL 3, lines 19-30). Mita et al briefly discuss secondary batteries (COL 1, lines 16-40). Mita et al also teach the cyclic carbonic esters can be used suitably for a solvent for the electrolytic solutions for use in batteries (COL 9, lines 35-47). These solvents may be used singly or in combination with one or more of them (COL 10, lines 3-5). These

solvents include ethylene carbonate, ethylene carbonate, butylenes carbonate and vinylene carbonate; cyclic esters such as γ-butyrolactone, 3-methyl-γ-butyrolactone and 2-methyl-γ-butyrolactone (COL 9, lines 47-60). In particular, Mita et al exemplified the use of <u>vinylethylene carbonate</u> in a mixed solvent (EXAMPLES 7 and 9).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the vinylethylene carbonate solvent of Mita et al in the secondary battery of Takami et al because Mita et al teach that cyclic carbonic esters can be used suitably for a solvent for the electrolytic solutions for use in batteries as such solvents show excellent acid resistance, are not oxidized when allowed to stand in the atmosphere, and are chemically stable without reacting with water under normal storage conditions or reacting with highly reactive substances such as metal lithium. In addition, such cyclic carbonic ester have the properties of being physically safe, being not readily thermally decomposed and being flame-retardant and resistant to electrochemical oxidation or reduction. *Furthermore, it is noted that Mita et al and Takami et al share the same field of endeavor of providing suitable non-aqueous electrolytic solutions for electrochemical applications or resistance to electrochemical oxidation/reduction. Thus, both references are relevant to each other. Moreover, since Takami et al directly teach the use of cyclic carbonic acid esters having at least one carbon-carbon unsaturated bond in a combination of mixed solvents, a cyclic carbonic acid esters can be interchangeably used to substitute another cyclic carbonic acid esters because they are deemed to be functionally and chemically equivalent.*

4. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takami et al US 2003/0118913 in view of Mita et al 6315918 as applied to claim 1 above, and further in view of the European document EP 0796510.

Takami et al and Mita et al are applied, argued and incorporated herein for the reasons above. However, Takami et al and Mita et al do not disclose the solvent comprising a glime.

The EP'510 document discloses a non-aqueous electrolyte system consisting of a solvent mixture containing ethylene carbonate, g-valerolactone and optionally containing one or more additional solvents selected from other organic carbonates as glymes (SECTION 0010-0011/ CLAIM 1).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the solvent comprising a glime of the EP'510 document in the solvent mixture of both Takami et al and Mita et al as the EP'510 document teaches that a mixture of solvents comprising glyme can be used in electrolyte systems for batteries as they can be applied in a broad voltage range, which has a conductivity higher than conventional conductivities at room temperature, and which shows a high stability against reduction.

5. Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takami et al US 2003/0118913 in view of Mita et al 6315918 as applied to claim 1 above, and further in view of Kida et al US 2001/0018152.

Takami et al and Mita et al are applied, argued and incorporated herein for the reasons above. However, the preceding prior art does not disclose the specific molar ratio of both lithium salts.

Kida et al disclose a lithium secondary battery (TITLE) wherein it has been reported that the charge-discharge cycle performance can be improved by using both $LiPF_6$ and $LiBF_4$ as the electrolytic salt of the nonaqueous electrolyte in a lithium secondary battery (SECTION 0006). Kida et al disclose a specific example using a mixture including $LiPF_6$ and $LiBF_4$ in a molar ratio of 4:1 (SECTION 0032/ TABLE 1-BATTERY X6).

[0006] For example, it has been reported that the charge-discharge cycle performance can be improved by using both $LIPF_6$ and $LIBF_4$ as the electrolytic salt of the nonaqueous electrolyte in a lithium secondary battery using Li_xMO_2

COMPARATIVE EXAMPLES 1 THROUGH 6

[0032] Comparative batteries X1 through X6 were fabricated in the same manner as in Embodiment 1 except that 1.0 mol/liter of $LiB(C_6F_5)_4$ dissolved in the preparation of the nonaqueous electrolyte was replaced with 1.0 mol/liter of $LiPF_6$, $LiBF_4$, $LiCF_3SO_3$, $LiN(CF_3SO_2)_2$, $LiN(C_2F_5SO_2)_2$ or a mixture including $LiPF_6$ and $LiBF_4$ in a molar ratio of 4:1.

X6	0.8 M $LiPF_6$ + 0.2 M $LIBF_4$	73

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific molar ratio of both lithium salts of Kida et al in the electrolyte-solvent mixture of both Takami et al and Mita et al 6315918 as Kida et al teach that it has been reported that the charge discharge cycle performance can be improved by using both $LiPF_6$ and $LiBF_4$ as the electrolytic salt of the nonaqueous electrolyte in a lithium secondary battery (SECTION 0006) as well as the capacity retention ratio is improved (SECTION 0034). Thus, it provides a lithium secondary battery exhibiting better charge-discharge cycle performance than a lithium using a conventional single non-aqueous electrolyte.

6. Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takami et al US 2003/0118913 in view of Mita et al 6315918 as applied to claim 1 above, and further in view of Inoue et al 6090506.

Takami et al and Mita et al are applied, argued and incorporated herein for the reasons above. However, the preceding prior art does not disclose the specific molar ratio of both lithium salts.

Inoue et al divulges a non-aqueous secondary battery wherein the electrolyte to be contained in the battery comprises one or more lithium salts soluble therein, particularly preferred, an electrolytic solution comprising $LiBF_4$ and $LiPF_6$ incorporated in a mixture of organic solvents (COL 12, lines 12-35). **EXAMPLE 1** shows the use of an electrolyte comprising $LiPF_6$ and $LiBF_4$ in an amount of 0.9 mol and 0.1 mol per L, respectively (COL 17, lines 12-20 or EXAMPLE 1).

propanesultone and one or more lithium salts soluble therein, such as $LiClO_4$, $LiBF_4$, $LiPF_6$, $LiCF_3SO_3$, $LiCF_3CO_2$, $LiAsF_6$, $LiSbF_6$, $LiB_{10}Cl_{10}$, lower aliphatic lithium carboxylate, $LiAlCl_4$, LiCl, LiBr, LiI, chloroboran lithium and lithium tetraphenylborate. In particular, an electrolytic solution comprising $LiCF_3SO_3$, $LiClO_4$, $LiBF_4$ and/or $LiPF_6$ incorporated in a mixture of propylene carbonate or ethylene carbonate and 1,2-dimethoxyethane and/or diethyl carbonate is preferred. Further, an electrolytic solution comprising $LiBF_4$ and/or $LiPF_6$ incorporated in a mixture of ethylene carbonate and/or diethyl carbonate is particularly preferred.

iron closed-end cylindrical battery case (11). Into the battery case was then poured an electrolyte comprising $LiPF_6$ and $LiBF_4$ dissolved in a 2:4:3:1 (by volume) mixture of ethylene carbonate, dimethyl carbonate, diethyl carbonate and ethyl propionate in an amount of 0.9 mol and 0.1 mol per l, respectively. The edge of the battery can was then cramped

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific molar ratio of both lithium salts of Inoue et al in the electrolyte-solvent mixture of both Takami et al and Mita et al 6315918 as Inoue et al teach an

electrolytic solution comprising $LiBF_4$ and $LiPF_6$ incorporated in a mixture of organic solvents is particularly preferred because it has been determined that such amount of electrolyte incorporated into a battery improves the discharge-charge characteristic of the battery. In addition, it has been generally-conventionally reported that the charge discharge cycle performance can be improved by using both $LiPF_6$ and $LiBF_4$ as the electrolytic salt of the nonaqueous electrolyte in a lithium secondary battery (SECTION 0006) as well as the capacity retention ratio is improved (SECTION 0034). Thus, it provides a lithium secondary battery exhibiting better charge-discharge cycle performance than a lithium using a conventional single non-aqueous electrolyte.

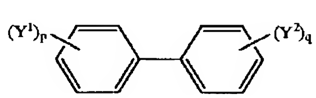
7. Claim 15 is rejected again under 35 U.S.C. 103(a) as being unpatentable over Takami et al US 2003/0118913 in view of Mita et al 6315918 as applied to claim 1 above, and further in view of Hamamoto et al US 2002/0001756.

Takami et al and Mita et al are applied, argued and incorporated herein for the reasons above. However, Takami et al and Mita et al do not disclose the solvent comprising a derivative of benzene.

Hamamoto et al disclose the following (ABSTRACT):

(57) **ABSTRACT**

A non-aqueous electrolytic solution favorably employable for a lithium secondary battery employs a non-aqueous electrolytic solution which comprises a non-aqueous solvent and an electrolyte which further contains 0.001 to 0.8 weight % of a biphenyl derivative having the formula:



In particular, Hamomoto et al teach the use of biphenyl derivatives and a cyclic compound group (SECTIONS 0016).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the solvent comprising a derivative of benzene of Hamamoto et al in the solvent mixture of both Takami et al and Mita et al 6315918 as Hamomoto et al teach that by using the benzene derivative as a solvent, a non-aqueous electrolytic solution which is favorably employable for a lithium secondary battery and which shows high battery performance such as high electric capacity and high cycling performance under maximum operation voltage condition or elevated temperature is obtained.

Response to Arguments

Applicant's arguments filed 06/17/04 have been fully considered but they are not persuasive. In addition, applicant's declaration filed under 37 CFR 1.132 and dated 06/17/04 has also been completely reviewed and entirely considered. The main contention of applicants' arguments is premised on the assertion that the prior art does not demonstrate unexpected results, specifically for the inclusion of VEC as well as for the use of the specific molar ratio of the combined lithium salts. However, this assertion is not sufficient to overcome the 35 USC 103 rejection for the reasons mentioned hereinafter.

With respect to unexpected results based on the results presented in EXAMPLE 6 and TABLES 12-13 (thereby demonstrating that there is a difference in the amount of gas generated), the examiner likes to point out that the foregoing performance characteristic of the exemplified

battery does not reflect or correspond to the performance characteristic of the claimed non-aqueous electrolyte battery because the objective evidence of nonobviousness is not commensurate in scope with the instant claims which the evidence is offered to support. For instance, it is noted that data of EXAMPLES 6 and TABLES 12-13 showing an effective reduction in the amount of gas generated after the battery cycles does not evidence unexpected results for the entire claimed range of 1-99 vol %, inclusive (i.e. $0 \prec$ VEC vol % $\prec 100$) as implicitly claimed in the present claims because as apparent from EXAMPLES 6 and TABLES 12-13, significant reduction in the amount of generated gas is achieved by ***specifically*** using the VEC solvent at a ***1 vol %*** **only** *[not for the entire claimed range of 1-99 vol %, inclusive (i.e. $0 \prec$ VEC vol % $\prec 100$) as implicitly claimed in the present claims]*. For that reason, it is contended that the objective evidence of nonobviousness is not commensurate in scope with the present claims.

Regarding the unexpected results based on the results presented in applicant's declaration filed under 37 CFR 1.132 which exhibits superior capacity maintenance rates, cycle lives and small amounts of gas generated after the cycles, the examiner also contends that the foregoing performance characteristic of the exemplified batteries does not reflect or correspond to the performance characteristic of the claimed non-aqueous electrolyte secondary battery because the objective evidence of nonobviousness is not commensurate in scope with the instant claims which the evidence is offered to support. For instance, it is noted that the tabulated data of paragraph 14 (see the declaration of 06/17/04) showing improved capacity maintenance rate, cycle life and reduction in the amount of generated gas does not evidence unexpected results for the entire claimed molar ratio of 1:9 to 9:1 because as apparent from such tabulated data results:

a) no significant or statistically difference is exhibited with respect to the capacity maintenance rate, that is, for the claimed molar ratio of 1:9 to 9:1 the capacity maintenance rate after storage (%) ranges from 82-84 while for the unclaimed range the capacity maintenance rate after storage (%) exhibits percents of 81 % and 84 %. Thus, it is asserted that no significant difference and/or superior results have been obtained for the capacity maintenance rate characteristic because the difference between the capacity maintenance characteristic rate of Batteries 1F/(a)/(b)/5F and Batteries 2F/3F/4F is equal to or less than 1 % , including no difference at all between Battery 2F and Battery (a); <u>accordingly, there is no unexpected results or superior characteristics ***at all*** between the instantly claimed molar ratio and the unclaimed molar ratio;</u>

b) as to the cycle life, as shown in the tabulated data, no expected results were obtained at least for <u>the claimed molar ratio $LiPF_6/LiBF_4$ of 1:9</u> because the cycle life of the foregoing molar ratio (*cycle life: 450*) is even lower than the cycle molar ratios $LiPF_6/LiBF_4$ of 0.05/0.95 (*cycle life: 470*) and 0/1 (*cycle life: 500*)<u>; hence, it is concluded that the entire claimed molar ratio is not critical because no unexpected results or superior characteristics have been positively identified for the entire claimed range of 1:9 to 9:1;</u>

c) with reference to the gas amount after cycles (mL), superior results appear to be obtained <u>only</u> at the claimed molar ratio of 9/1 as the gas amount of the remaining claimed molar ratio ranging from 1/1 to 1/9 (*gas amount: 2.2 mL and 2.5 mL, respectively*) is either equal to or even lower than the gas amount of the unclaimed molar ratio of 1/0 and 0.95/0.05 (*gas amount: 2.3 mL and 2.2 mL, respectively*); <u>therefore, it is also concluded that the entire claimed molar</u>

ratio is not critical because unexpected results or superior characteristics were not found for the entire claimed range of 1:9 to 9:1.
For that reason, it is contended that the objective evidence of nonobviousness is not commensurate in scope with the present claims.

In addition, as to the superior performance characteristics of the results presented in applicant's declaration filed under 37 CFR 1.132 which exhibits superior capacity maintenance rates, cycle lives and small amounts of gas generated after the cycles, the examiner further states that such results and, thus, the specific battery as set forth in the tabulated data of paragraph 14 are *not commensurate* to the specific non-aqueous electrolyte battery as claimed in claim 14. In this respect, it is emphasized that the claimed non-aqueous electrolyte battery includes the use of VEC as a solvent while the experiment of the declaration were performed in the absence of VEC solvent, thus, the batteries of the declaration lack, at least, ***one*** significant, essential, vital and/or crucial feature, for instance, the specific VEC solvent. Thus, the foregoing performance characteristics of the exemplified declaration's batteries do not reflect or correspond to the performance characteristic of the claimed non-aqueous electrolyte battery as instantly claimed in claim 14.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (*i.e.*, *"the VEC*

forms a coating or a strong film on the surface of the negative electrode of a non-aqueous electrolyte secondary battery as occurs in the present invention") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument that "*Mita is directed to a non-aqueous electrolytic solution for capacitors*", the fact that applicant has recognized another advantage/disadvantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). If applicants further contend that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). *In this case, it is noted that Mita et al and Takami et al share the same field of endeavor of providing suitable non-aqueous electrolytic solutions for electrochemical applications or resistance to electrochemical oxidation/reduction. Thus, both references are relevant to each other. Moreover, since Takami et al directly teach the use of cyclic carbonic acid esters having at least one carbon-carbon unsaturated bond in a combination of mixed solvents, a cyclic carbonic acid esters can be interchangeably used to*

substitute another cyclic carbonic acid esters because they are deemed to be functionally and chemically equivalent.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
Art Unit 1745